TYPES A and B

RURAL HOUSING.

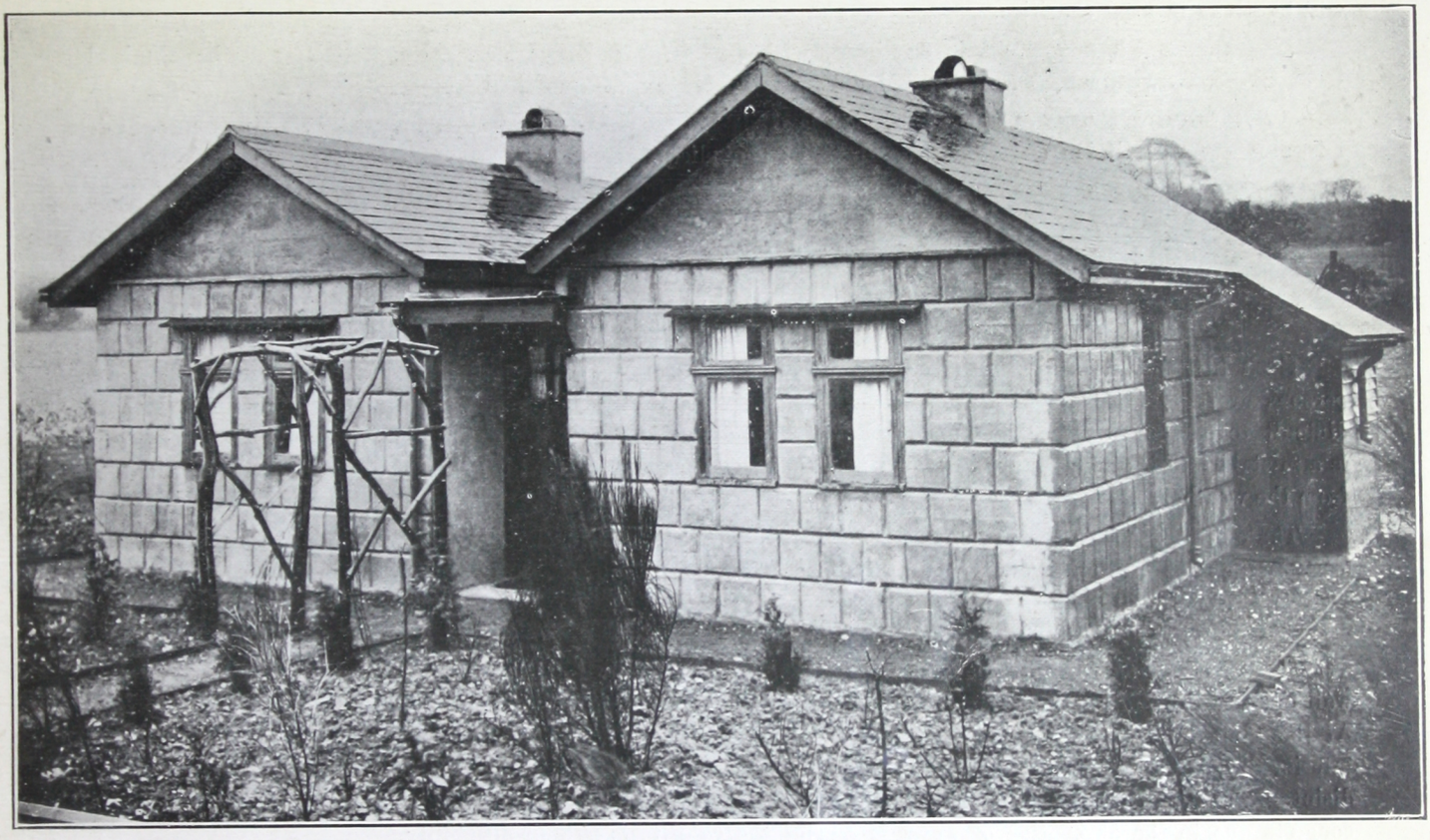
THE

£250 COTTAGE.

Price 1/-

Printed and Published by the Kentish District Times Co., Ltd., Sidcup, Kent.

The "Nash" Bungalow.



A Photograph of the cottage of the bungalow type as erected by Mr. T. H. Nash at St. Paul's Cray, Kent, at a cost of £250. Inspected by the Officials of the Ministry of Health who have sanctioned loans for 60 years on these houses, and authorized the payment of subsidies.

Printed and Published by the Kentish District Times, Co., Ltd., Sidcup, Kent.

13.10.26.

GARLAND HILL,

ST. PAUL'S CRAY, KENT.

SIR OR MADAM,

The Nash Clinker Block avoids many of the disadvantages of other concrete blocks. Therefore, many architects and builders have approved of them, and the Ministry of Health has sanctioned their use for State-aided houses. The exterior of the block is impervious, the interior surface is finished with absorbent plaster, not too smooth to cause condensation, and the core is cellular to reduce thermal transmission.

The total cost of these houses, exclusive of land, drainage, water, lighting, fences, and paths is estimated at £250, and I have been asked so many times to supply a full description of the method of building them that I have decided that it will be more convenient to issue a pamphlet giving full information, for which a charge of 1/- will be made to defray the expenses of the publication, but if there is any profit on the sales it will be given to local charities.

Drawings and specifications in duplicate, with forms for ordering standard materials, may be obtained from Mr. S. G. Pettman, "East View," Sidcup Hill, Sidcup, at a nominal fee.

No Royalty or charge of any description is made for the use of the system, and under no circumstances do I receive any commission or discount on the goods supplied.

Yours faithfully,

(Signed) T. H. NASH.

GENERAL PRINCIPLES.

Nash houses are **fire resisting, hygienically sound,** and almost **vermin proof,** but unfortunately most persons are conservative by nature, and have a prejudice against all new methods of construction which is difficult to overcome. On the other hand, the suggestion that anything is good enough for a workman's house is a mistake and if occupiers are to take a pride in their homes they must be something more than mere shelters from the weather.

The clinker block is the principal factor in producing these cheap houses, therefore **the costs of materials, manufacture and erection** are supplied as well as a few **notes on condensation and durability.**

IMPERMEABILITY, DURABILITY AND "BREATHING."

The transmission of air through a wall generally referred to as "breathing" is essential to maintain a wall in a healthy and dry condition and prevent the wall timbers and ends of the joists from developing dry rot. At the same time it is necessary for the external face of a wall to be impervious not merely to keep the interior dry, but to avoid any absorption which causes expansion of the outer skin of the wall and gradually disintegrates the particles until finally the frost will destroy the surface. The expansion of stone, brick and concrete due to the absorption of water is one of the chief tests of their durability.

No air bricks, however, are necessary to ventilate the porous core of the **Nash block** from the outside because while the outer surface is impervious the inside is porous and the wall breathes from the inside where the air is cooler in summer, warmer in winter and drier in damp weather.

CONDENSATION.

Condensation on the interior of house walls roughly depends on three main factors, (a) the humidity of the atmosphere, (b) the thermal transmission of the wall, and (c) the internal surface of the wall.

(a) HUMIDITY.

This varies in different districts at different seasons of the year.

(b) THERMAL TRANSMISSION.

The transmission of heat through the walls of buildings depends generally on (a) the difference of external and internal temperature, (b) the materials and construction of the walls, (c) the surface of the wall and (d) the area of the wall.

Ignoring the questions of wind, colour, evaporation of moisture on the external surface and other minor matters, the thermal transmission of various types of walls may be classified as follows:—

		Constant
*1.	11½in. concrete cavity wall (4½in. of ballast and 4½in. of clinker)	.30
*2.	11½in. brick cavity wall	.33
3.	9in. brick wall	.43
4.	**4½in. porous clinker wall with all fine stuff removed**	**.46**
5.	4½in. rough clinker concrete	.55
6.	4½in. brick	.57
7.	4½in. ballast concrete	.61

*Note.—If the cavities are ventilated the transmission will be 5 to 10 per cent. faster.

A careful examination of these facts clearly shows (a) the superiority of clinker concrete over brick work or ballast concrete, (b) the benefit of voids, and (c) the advantage of still air or unventilated cavities providing the outer face of the wall is impervious.

(c) Internal Surface of Walls.

When the surface of a wall is highly polished and of light colour it is slow to absorb heat either from the direct rays of the fire or the conduction or convection of the air. Consequently it remains cold like a marble fireplace, glazed tiles or a painted and enamelled wall, and when humid air comes in contact with such a wall the air is cooled and gives off a portion of its moisture in proportion to its reduction of temperature. If the action continues and the material cannot absorb the moisture, owing to its impervious nature or the filling up of the pores by the polishing, the condensation will show on the surface and become unpleasant. The interior of rooms should not, therefore, be finished with waterproof materials, highly polished, or hard plasters, oil paints, varnished wall papers, etc.

WEATHER RESISTANCE.

The extra thickness of the impervious outer skin at the edges of the blocks not only strengthens them, but also prevents any driving rain penetrating behind the impervious skin if any pointing is damaged. Failure to realize this fact has ruined the reputation of many methods of concrete block construction.

As the cement mortar is not spread over the full thickness of the beds and joints of the blocks dampness cannot penetrate by capillary attraction.

WARNING.

Unskilled men employed on new methods of construction are generally subject to a considerable amount of public notice, and they are apt to work too hurriedly and execute the work badly, with the result that the reputation of the system suffers.

DESCRIPTION OF CONSTRUCTION.

MOULDS AND PALETTES FOR MAKING THE BLOCKS.

A useful design for the frames and moulds is shewn in Figure 1. The side and end pieces have three saw-cuts along their length made by a circular saw, and 6in. nails are driven into drilled holes to keep the wood from warping. The cost of these moulds will be about £7, but they may be afterwards sold or let out on hire.

To prevent the concrete from adhering to the moulds, the timber should be whitewashed, rubbed with a paraffin rag or smeared with soft soap. If care is taken the frames can be removed from the blocks a few hours after they are made and the frames re-used with the spare palettes which are provided. The floor on which the blocks are made should be level, otherwise the blocks will not be true, and all palettes and moulds should be placed on long wooden strips similar to slaters' laths so that the blocks can be turned on their edge to season.

BLOCK MAKING.

The blocks are 6in. thick and 12in. high, and can be made by anyone. The clinker is first put through a screen of ¼in. mesh to take out all the dust, and then through a 1in. screen to remove the large material which will mostly consist of hard clinker. This should be crushed as fine as possible and screened, and

four to five parts of it, together with one to two parts of sand and one part of cement, should be mixed with water to form the outer impervious face of the blocks. It is not necessary that the sand should be exceptionally sharp as the particles of fine clinker are irregular, consequently soft sand will do, and it is generally cheaper and easier to obtain. The concrete should not be too wet, but just sufficiently moist to carry the fine material to the surface of the block and ensure a smooth face. The concrete should be placed in the moulds to a depth of an inch and brought up at the edges another one to two inches to strengthen them. The concrete for the core of the block should be composed of six parts of the coarse clinker (which passed through the 1in. screen but failed to pass through the ¼in. screen) mixed with one part of cement and filled into the moulds to within ¼in. of the top. A little of the fine concrete similar to that used for the outer face can then be added to fill up the interstices, and the block can either be left for a few hours or floated at once with a mixture of Keen's cement or Sirapite and three parts of the fine dust clinker to pass through a fine mesh. The surface should be smoothed with a plasterer's trowel, and if a specially good surface is required it can be brushed over with grout made with Keen's cement or Sirapite and again rubbed up with a trowel.

FOUNDATION (Fig. 2).

The foundation should be carried up to about six inches above the level of the ground with cement concrete composed of six parts of clinker or ballast and one of cement laid into a trench of a width and depth depending on the nature of the sub-soil. The space within the walls should be levelled and filled in with six inches of hard core or other suitable material mixed with clinker and well rammed. This should be covered up with four inches of concrete composed of one part of cement and six parts of clinker to pass a 1in. screen with the fine stuff left in. It may be easier to form the wall foundations two or three inches wider than is necessary and cut off the projection after the blocks are in position.

DAMP-PROOF COURSE.

When the surface of the above concrete is dry it should be entirely painted with one coat of collastic or bituminous compound and an additional coat should be applied where walls and partitions are to be erected.

ERECTION.

Drawing (Fig. 4) shows the number of blocks required and how they are laid.

In order to simplify erection and ensure complete porosity throughout the wall, it is important to coat only the edges of the beds and joints with cement mortar (3 to 1) and not the whole surface of the blocks. The blocks should be laid with the inside face fair, as any slight irregularity on the outside is not noticed owing to the chamfered edges of the blocks. The inside of all beds and joints should be raked out and flush pointed with plaster similar to that used for the internal face of the blocks.

ROOF AND CEILING.

After the walls are erected and the windows built in, 3in. × 2in. rafters and collars should be fixed 18in. apart on 4in. × 3in. wall plates and so arranged that the sheets of asbestos for the ceiling, which are 3ft. wide, will not require to be cut. The height of the room in the centre will be about 10ft. and the joints of the sheets can be covered with 2in. × ⅜in. wood fillets coated with creosote or solignum before they are fixed to give a good effect.

CHIMNEYS.

The flues are formed with fibre cement sheets, fixed to battens at the corners as shown, and filled in round flue pipes with concrete. The fireplaces are formed in a similar manner.

The Section (Fig. 3) shows a chamber over the fireplace so that if the wind causes a down draught it is broken up and prevents the fire from smoking although only one flue is used for two fireplaces. The flues are lined with 9in. unglazed fireclay pipes.

PARTITIONS.

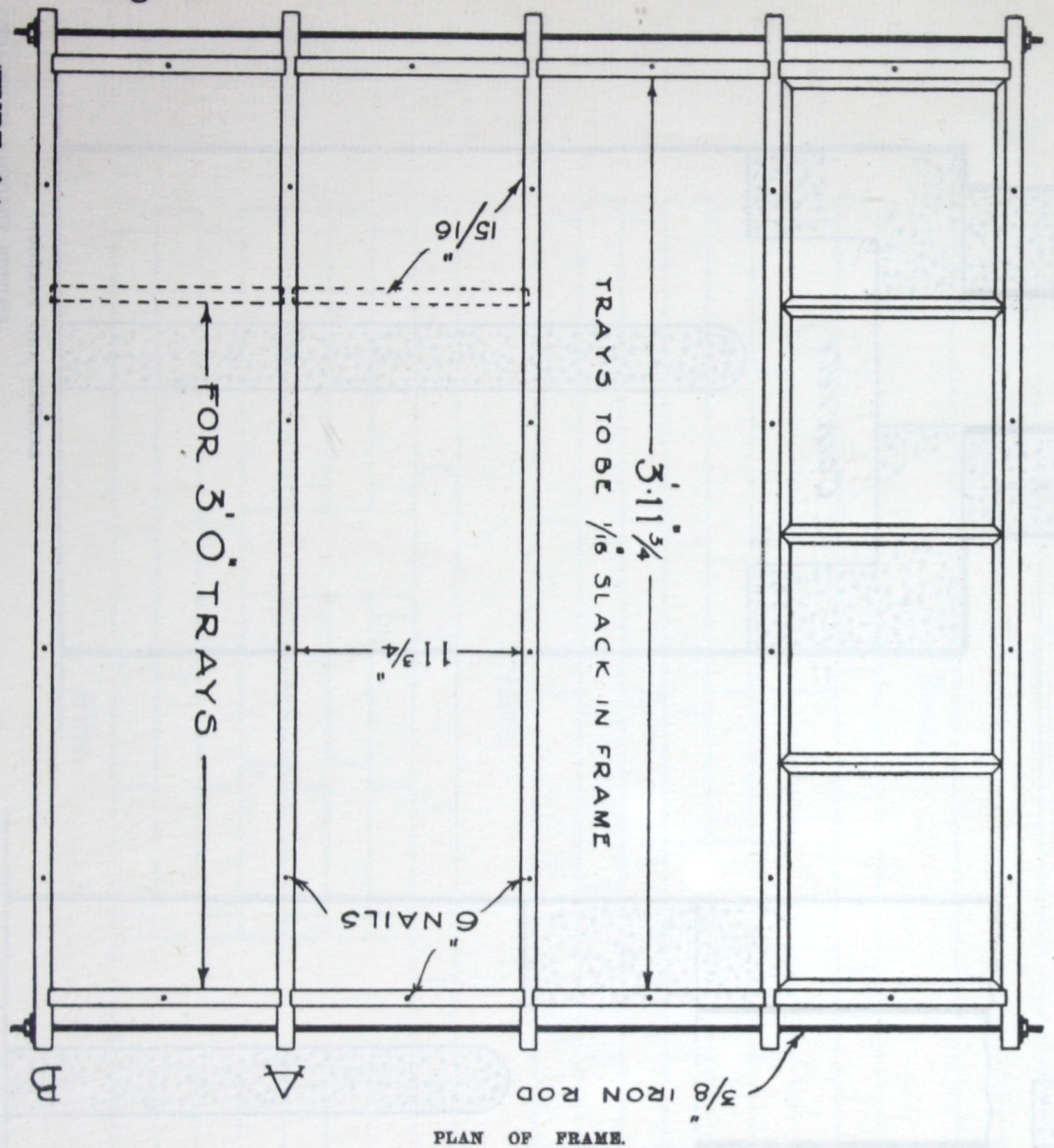
The partitions are formed by 3 × 2 studs covered on both sides with asbestos cement sheets 3/16in. thick and the space between the sheets is filled with concrete composed of six parts of clinker and one of cement. A narrow strip of asbestos sheet is fixed at the top and the concrete can be filled up to this level.

FLOORING.

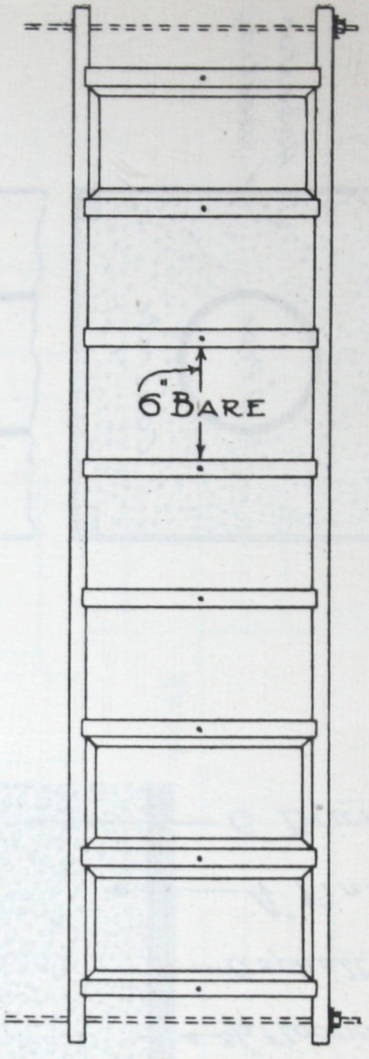
The floor boards should be coated with creosote on the under side and nailed direct to the clinker concrete after a coat of collastic has been applied.

Fig. 1.

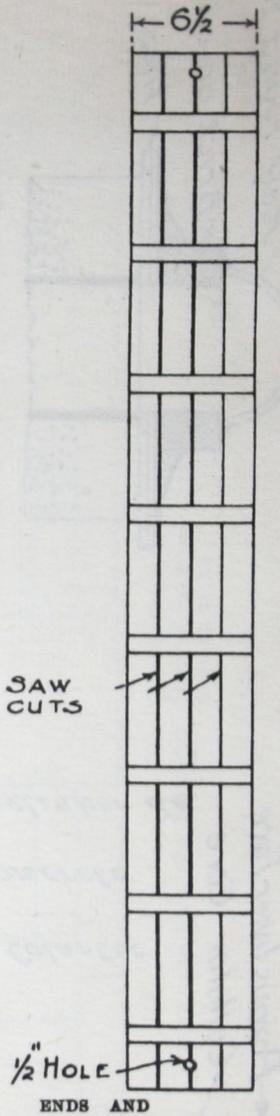
(TYPE A.)



PLAN OF FRAME.



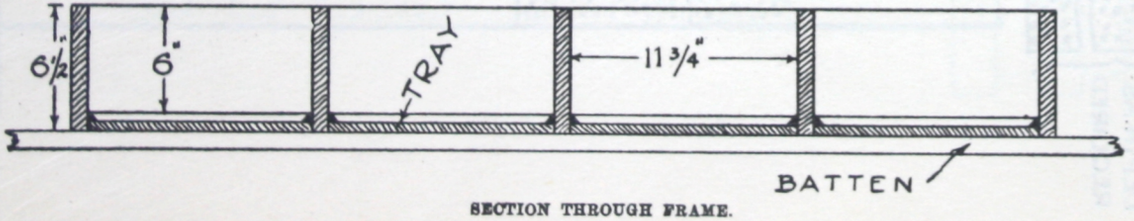
TO REPLACE
A. B. FOR 6in. BLOCKS.



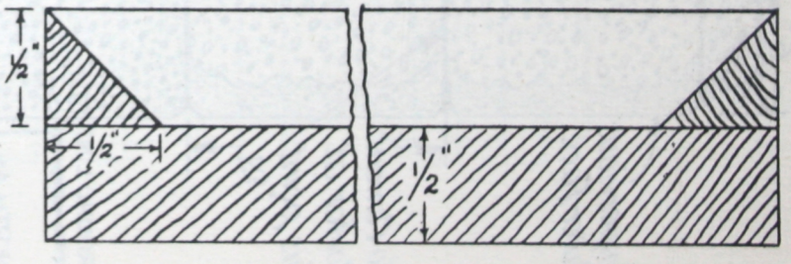
ENDS AND DIVISIONS.

A Set of Moulds, etc., for one Bungalow consists of:—
2 Sets of 4ft. Frames and 12 4ft Trays.
2 Spare Frames as A and B and 6 6in. Trays.

2 Sets of 3ft. Frames and 8 3ft. Trays.
8 3-8th rods with wing nuts, and 38 end pieces as shown.

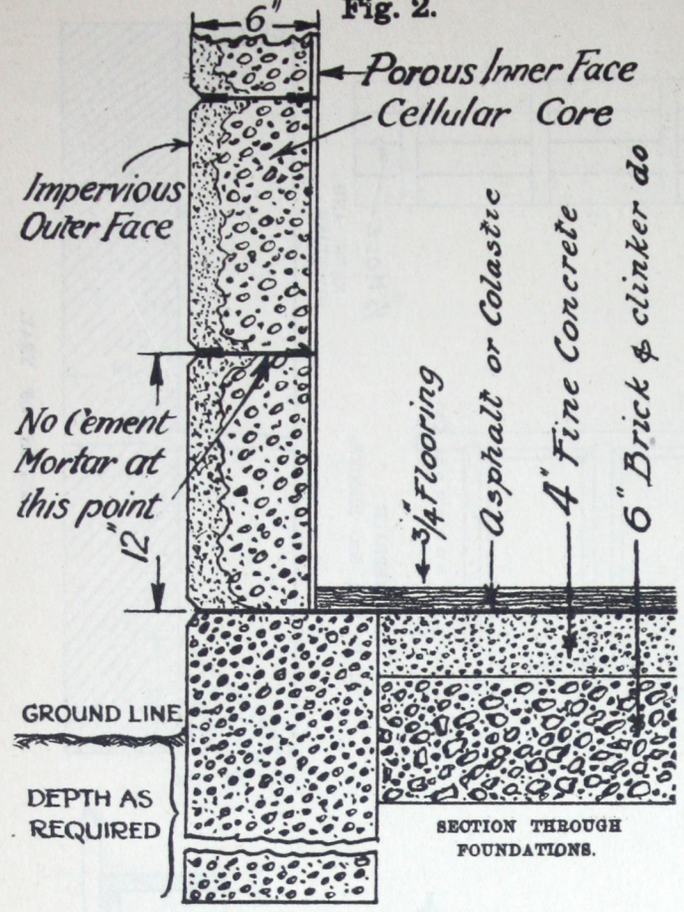


SECTION THROUGH FRAME.

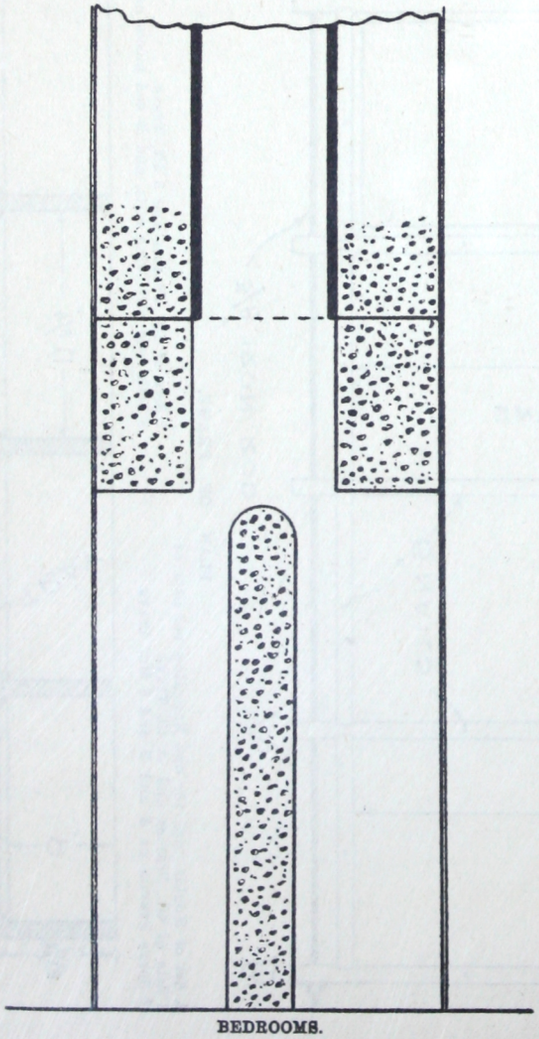


SECTION OF TRAY.

Fig. 2.

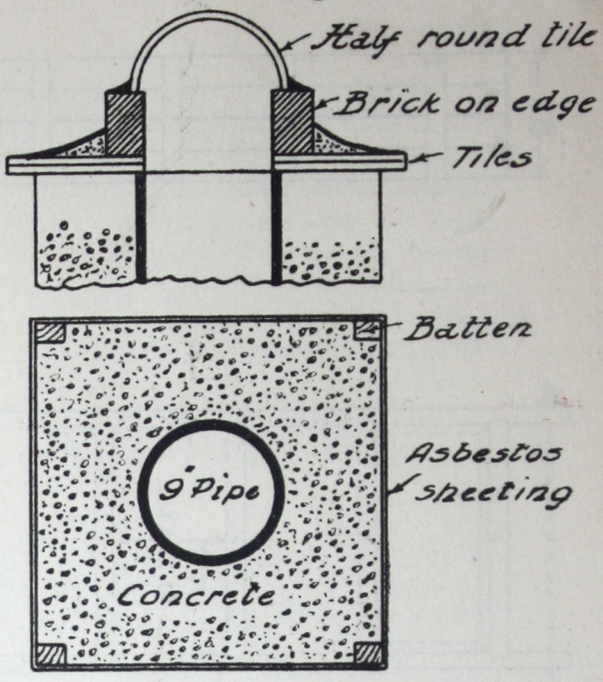


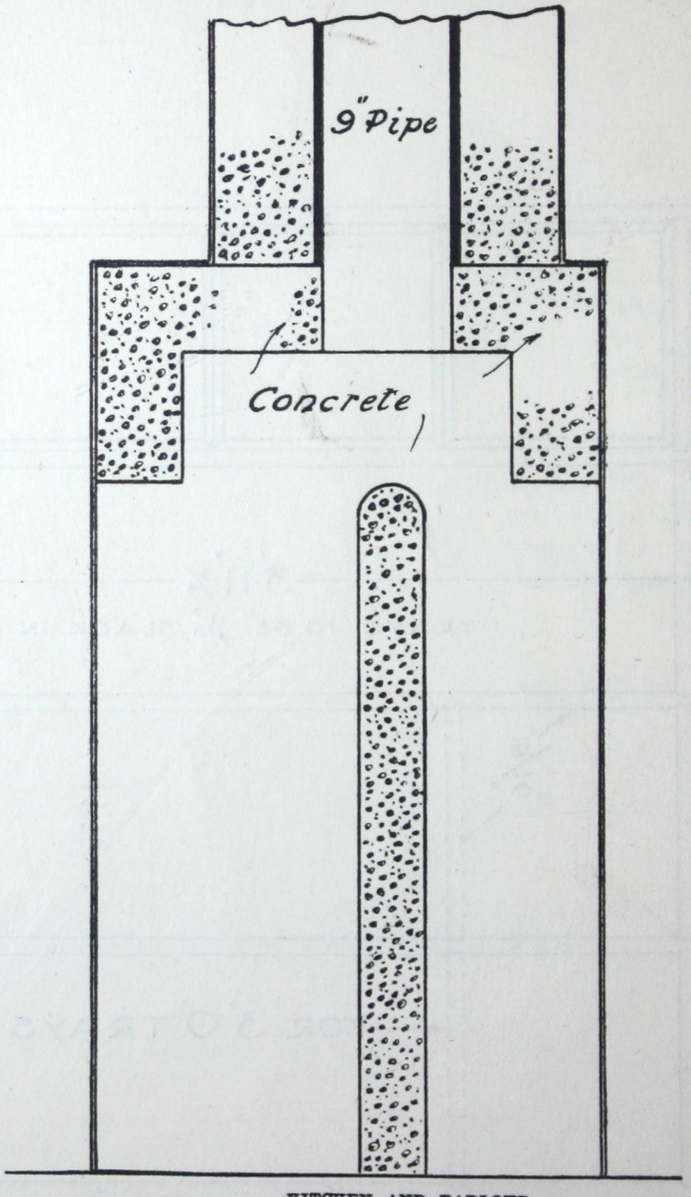
SECTION THROUGH FOUNDATIONS.



BEDROOMS.

Fig. 3.



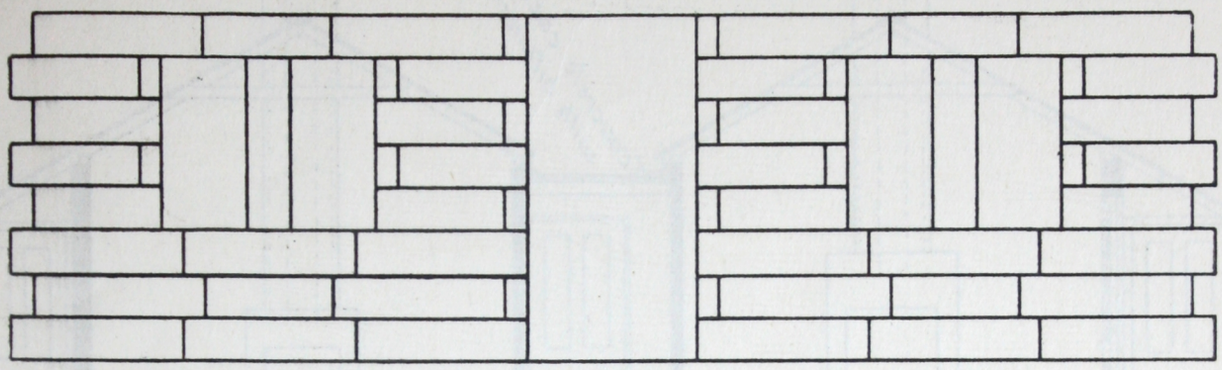


KITCHEN AND PARLOUR.

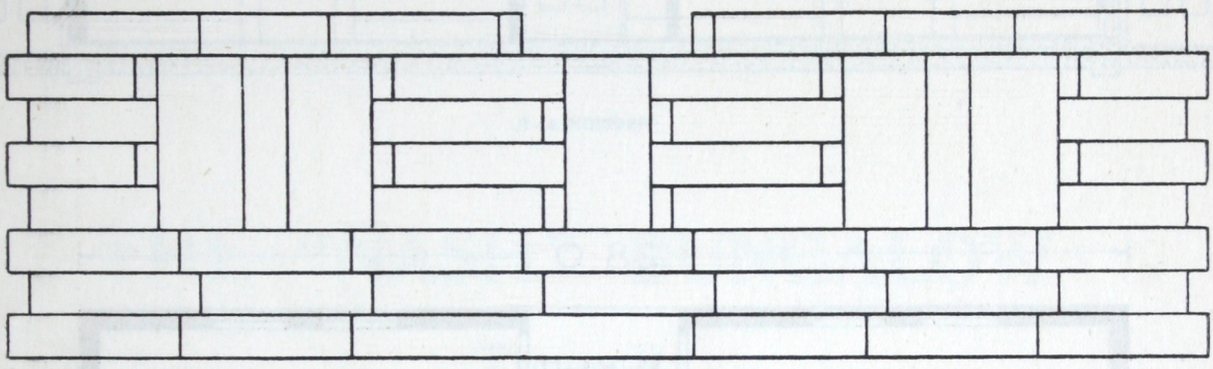
SECTION THROUGH FIREPLACES.

Fig. 4.

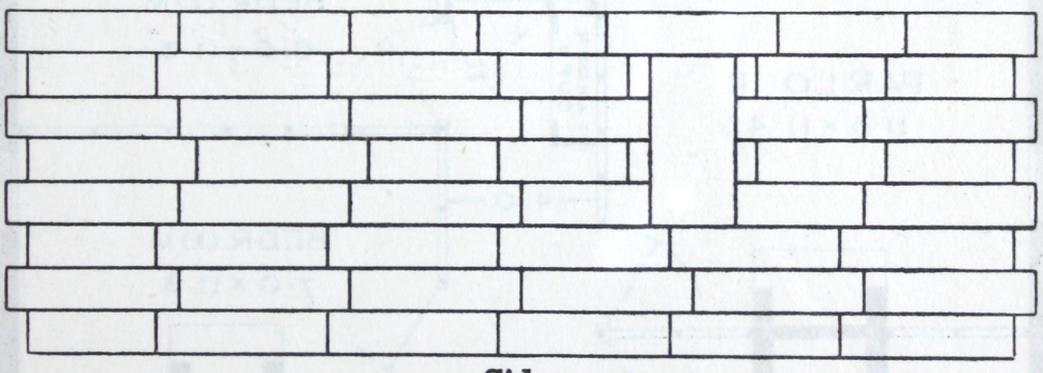
106 4ft. BLOCKS
75 3ft. BLOCKS } REQUIRED FOR EACH BUNGALOW.
46 6in. BLOCKS



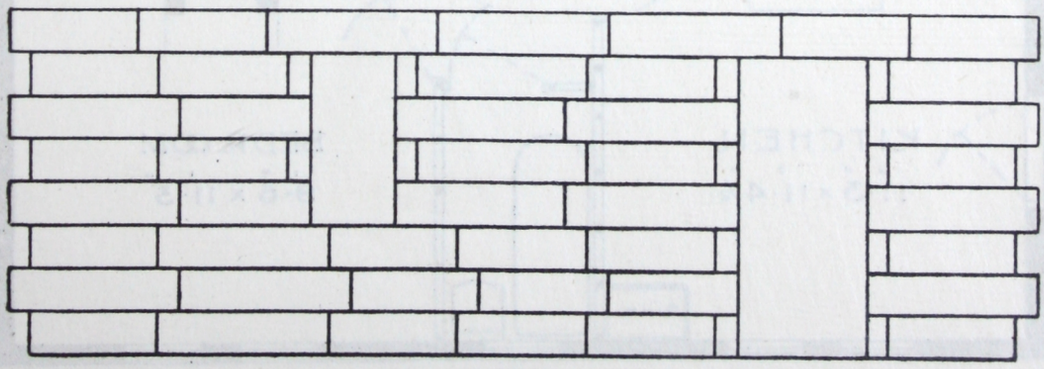
Front.



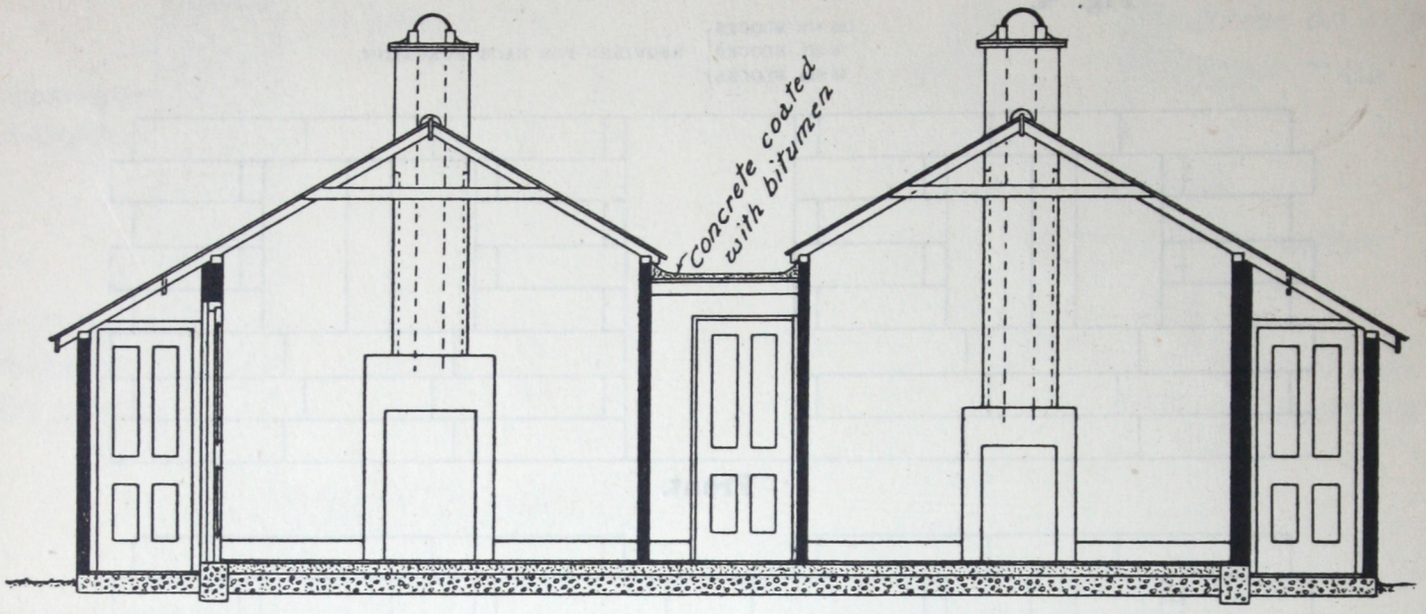
Rear.



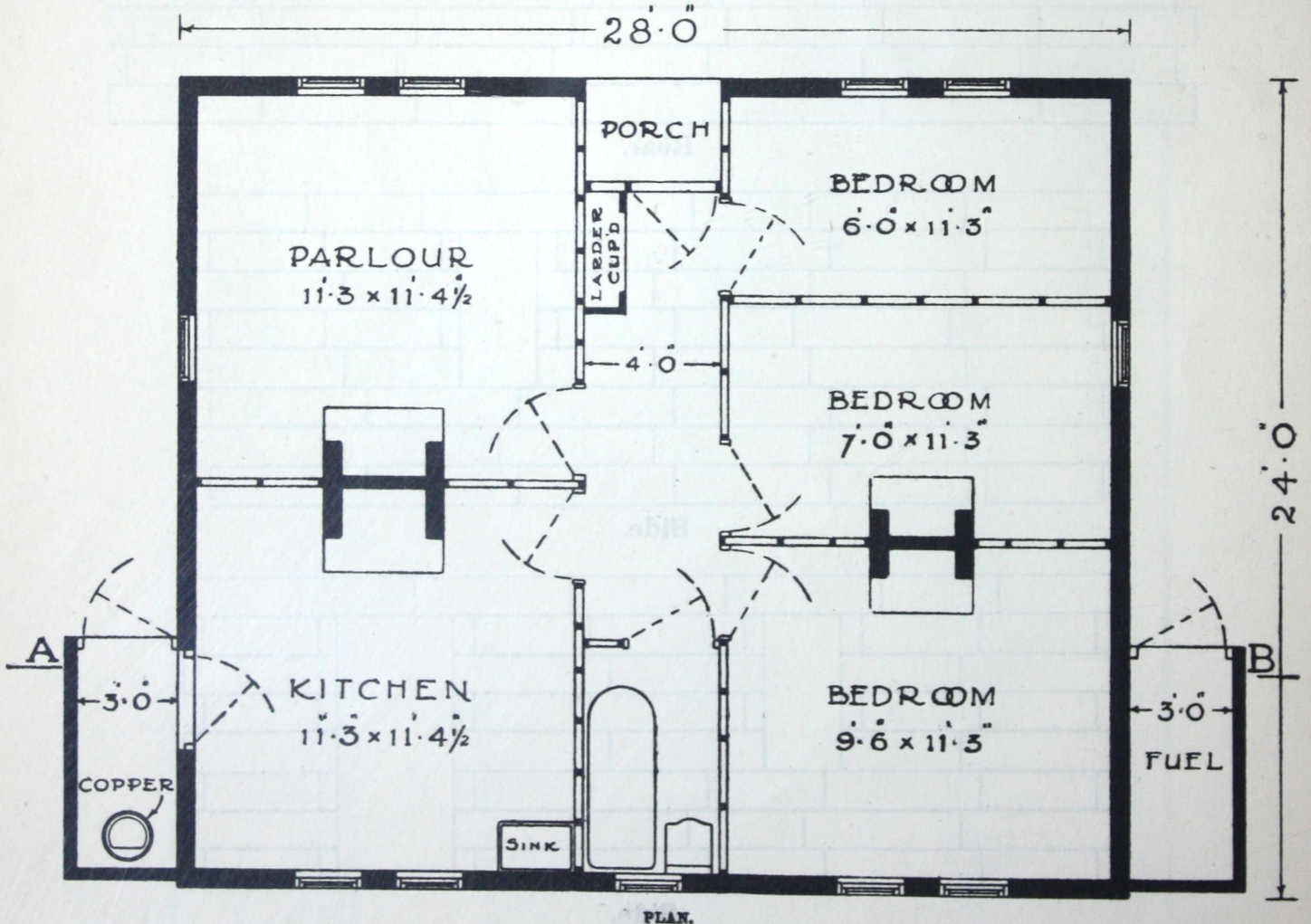
Side.



Side.



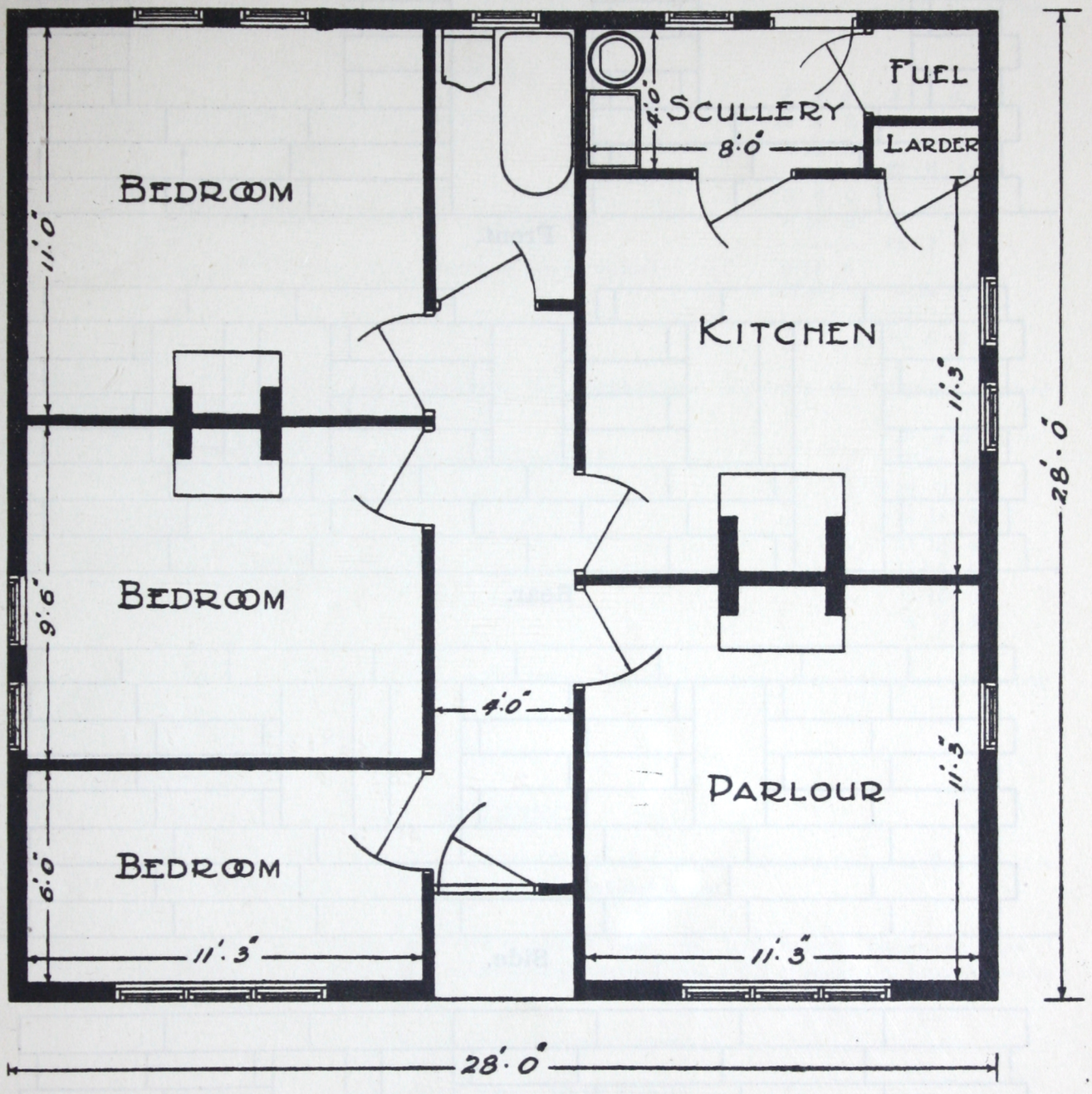
SECTION A—B.



PLAN.

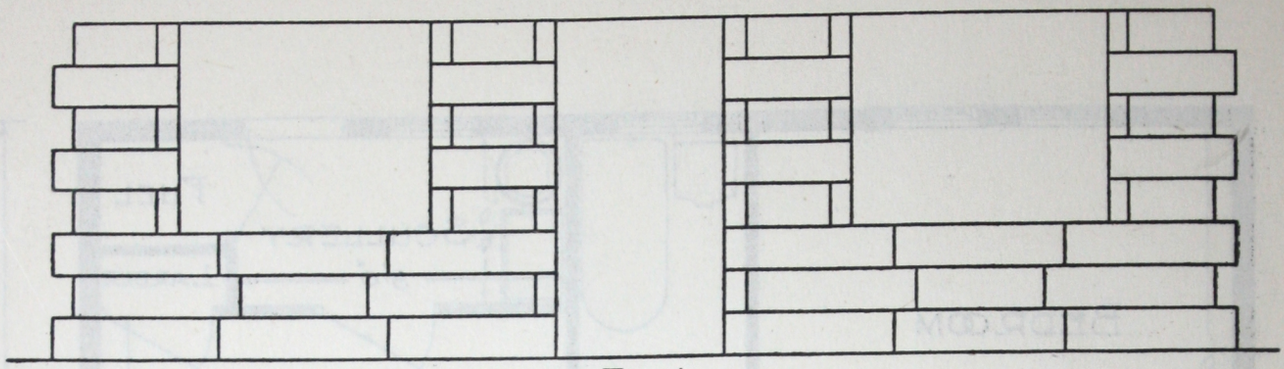
THE "NASH" BUNGALOW

Type B.

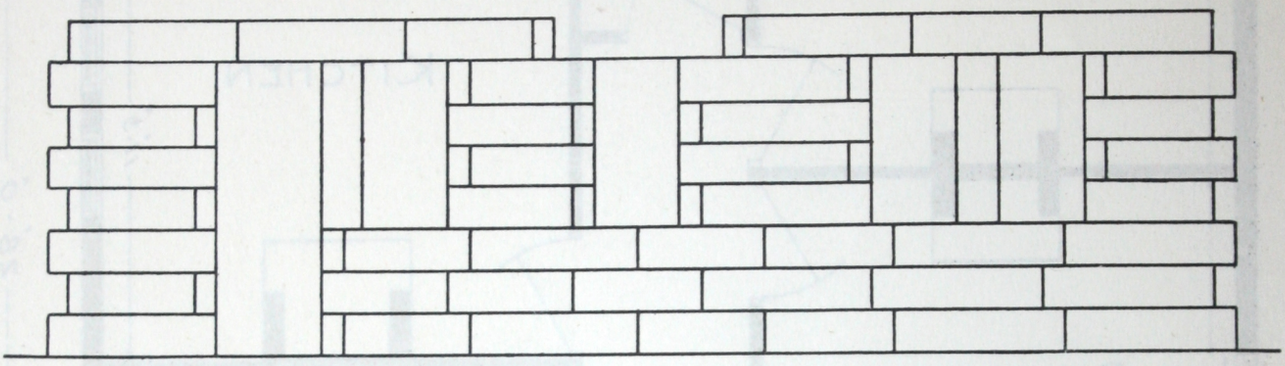


THE "NASH" BUNGALOW.

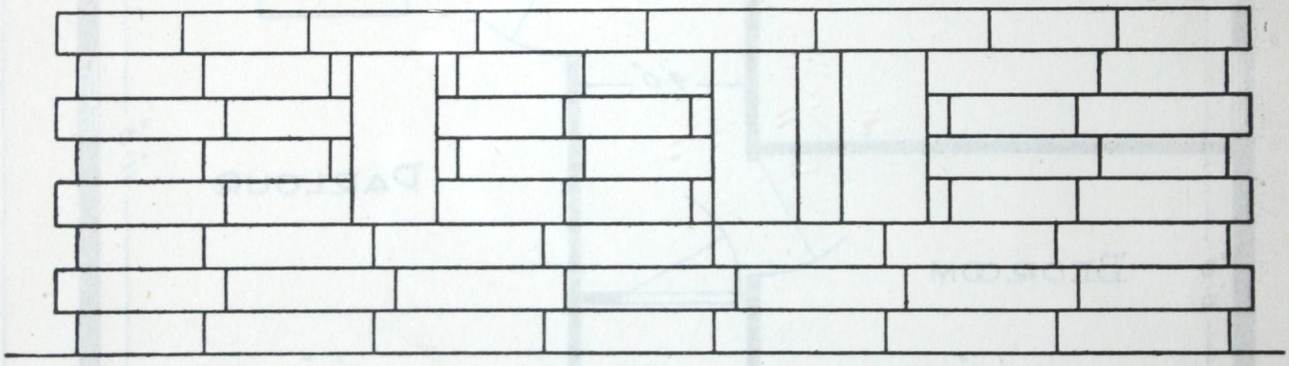
(TYPE B)



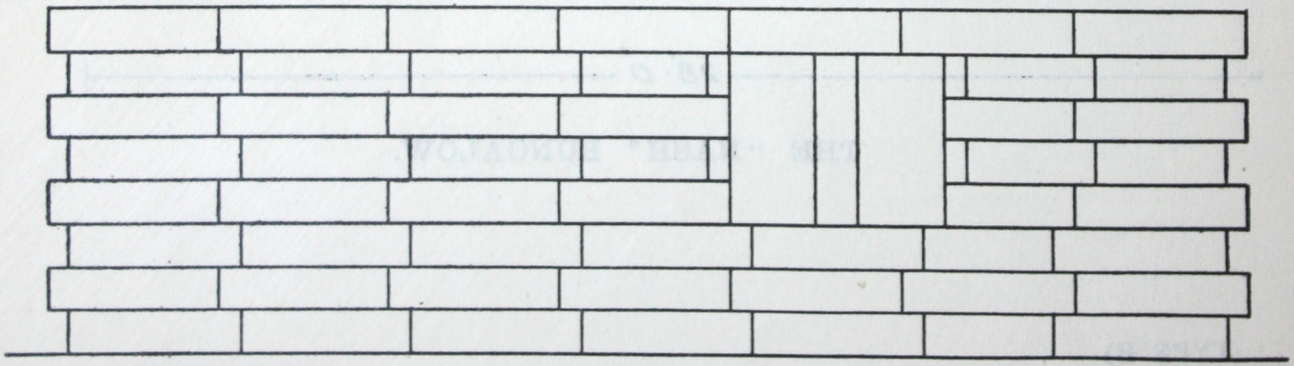
Front.



Rear.



Side.



Side.

BLOCKS REQUIRED—

104	4' 0"	12	2' 0"
66	3' 0"	49	6"

(TYPE B)

PRICES AND COSTS.

The following prices have been supplied to me by persons who are now erecting my standard houses, and they confirm my own experience.

MATERIALS AND LABOUR FOR ONE HOUSE:—

	£ s. d.	£ s. d.
Clinker, ashes, cement, sand, etc., for blocks	12 7 3	
Labour for making blocks	9 19 3	
		22 6 6
Material for foundation	9 9 0	
Labour laying foundation	8 18 9	
		18 7 9
Labour and mortar erecting walls (including use of tackle) ...	6 14 0	
		6 14 0
		47 8 3

Persons intending to erect similar houses in the neighbourhood can obtain the following standard materials at the prices named from various firms.

	£ s. d.
Windows, all hinges and fasteners fitted and creosoted	11 15 3
Doors with frames and furniture	14 0 0
Timber	21 18 3
Fibro-cement sheets	11 19 4
Tiles, complete with nails, etc.	10 1 0
Bath, stoves, sink, copper w.c. set complete	13 10 9
Guttering	4 3 0

N.B.—The £250 does not include cost of land, paths, fences, lighting, laying on water, drainage or connecting to sewer.

ROOFING.

Various materials have been used and it is probable that the cheapest and best, unless skilled labour is obtainable, is russet brown rectiles, which can be laid by unskilled labour.

The valley between the roofs has been formed in various ways, viz., lead, concrete blocks, etc., but if finished as shown and coated with two coats of collastic, and arranged with a fall of about 1in. from the centre to each end, no difficulty should arise.

HINTS ON BUILDING.

If the 1in. impervious facing of the blocks contains a bituminous coal that is not dead, it will be liable to blow on the outside of the blocks. In one case I got about 20 blows about the thickness and size of a shilling. The presence of coal is not detrimental in the centre of the blocks as the cellular core allows any gas generated to escape. If clinker or ash has been weathered for some months it will be dead, and precautions will not be required.

Do not attempt to turn the blocks on edge until fairly dry. A little experience will teach you when to do this.

Creosote all wood some days before use and be sure to treat all wood exposed to the weather.

Do not try to alter sizes. The method of construction is really a cross-word puzzle, and took far longer to work out than to build, in order to save material and cutting.

You can add a number of either three or four feet blocks to the depth of house to make the rooms longer if you wish. The frontage of the house, however, is difficult to alter.

The design provides for a fairly large cupboard, with dresser over same in the kitchen, and a cupboard in front room. It will be noted that as the front door is three feet wide and the passage is four feet wide, a larder safe can be built three feet wide and one foot deep in the passage.

After the house is finished the outer walls should be cement-washed once or twice, depending on the accuracy of the work, and then distempered to any colour required, which should not be too deep in shade—a cream or broken white is probably best.

OPINIONS OF PUBLIC AND PROFESSIONAL MEN.

Sir Henry Lennard, Bart., J.P., Chairman of the Bromley Rural District Council, one of the first to inspect the bungalow, wrote:

"I am thoroughly pleased with this cottage. If approved by the Ministry I consider that it has solved the rural housing problem. I congratulate Mr. Nash with all my heart."

Mr. Waldron Smithers, M.P., who has been interested in the experiment from the outset, says:

"I only hope the country will be able to take advantage of Mr. Nash's public-spirited action in trying to solve the housing problem. The bungalow is practical, artistic, and can be let at a rent within reach of all. I appeal to all who see it to make it widely known and try to get as many built as possible."

An Architect states:

"When reducing your scale drawings of the bungalow I was very surprised at the simplicity of the construction. By standardising the blocks and all openings you have reduced the labour to a minimum and eliminated all waste."

Another Architect writes:

"Mr. Nash, with great public spirit, has made a most interesting new experiment. He seems to have broken all the accepted canons of building with satisfactory results; two fireplaces go into one flue and yet neither fire smokes. The walls can be constructed by unskilled labour. The experimental house, if erected in considerable numbers, must result in very cheap building. I consider the house an important contribution to the solution of the housing problem, and as such should be studied and watched with great interest."

The Engineer to the Stanton Ironworks writes:

"I have visited the house built by Mr. Nash and must say that (after upwards of 15 years experience of concrete work) I have never seen anything quite like it in concrete before. Mr. Nash has departed from all previously accepted theories, and as a result has not only cut down the price by about a half but has succeeded in building what appears to be a perfectly sound construction, free from condensation on inside without cost of lining same. I admire the method very much."

OPINIONS OF THE PRESS.

INSPECTION BY MEMBERS OF PARLIAMENT.

(Reprinted from the *KENTISH TIMES*).

An important development in connection with the model bungalow erected by Mr. T. H. Nash, at St. Paul's Cray, was reached on Wednesday, when a party of Members of Parliament visited St. Paul's Cray and Horton Kirby, where similar bungalows are being erected. The party consisted of Major E. A. Ruggles-Brice, Colonel Windsor-Clive, Major G. A. Davies, Captain D. Gunston, Mr. R. A. N. Neville and Mr. Waldron Smithers.

The visit was due to the persistent efforts of Mr. Waldron Smithers and Mr. T. H. Nash to bring the methods employed locally to the notice of Members interested in the housing problem, particularly in rural areas.

The tour of inspection commenced at St. Paul's Cray, where the visitors were shewn the materials and methods employed in the manufacture of the concrete blocks. The foundation of a second bungalow to be erected at St. Paul's Cray was then inspected, and its composition, including its damp proof properties, fully explained.

The party then proceeded to Horton Kirby, where two similar bungalows, which are being erected by Mr. William Rogers, afforded a further excellent opportunity of seeing the materials and methods employed.

On the return journey a call was made at the St. Paul's Cray bungalow, which was erected last year, thus enabling the visitors to see a practical test of the weather resisting properties of the construction, and also to compare some interesting modifications of the original specification. The finished bungalow and those in process of erection were subjected to the closest possible scrutiny and in reply to a fire of questions, Mr. Nash gave his reasons for the methods adopted, and also the experience upon which they were based.

In turn the visitors at the close of the tour expressed their opinions of the structure in the following terms :—

Major Ruggles-Brice said the bungalow is a very ingenious and novel method of construction. Simplification of construction and lowness of cost should very materially contribute to a solution of rural housing.

Captain Gunston's comment was, " A very interesting method of construction, better and cheaper than the Weir houses, and less prejudices to overcome. I would like to see some two storey houses built. If we can persuade local authorities to adopt the method I think our local rural housing problems may be overcome."

Major Davies also said that the simplicity and standardisation throughout not only reduces the cost, but should enable the cottage to be built by quite inexperienced labour. It should be of really great assistance in solving the problem of the rural cottage.

Colonel Windsor-Clive and Mr. Neville concurred in these opinions.

It was pointed out that the construction of the bungalows at Horton Kirby had proved conclusively that they could be built for the figure stated by Mr. Nash, viz., £250 each, and Mr. Waldron Smithers emphasised the fact that it was now up to local authorities to use the scheme.

Major Ruggles-Brice, in reply, said that in view of the impending development of new coal areas, the scheme should be brought to the notice of the Mining Association.

On leaving the visitors cordially thanked Mr. T. H. Nash for the arrangements made for the visit, and for the opportunities of inspecting the bungalows.

NEW METHOD OF USING CONCRETE.

(Reprinted from *THE TIMES*).

A number of Members of Parliament interested in rural conditions, to-day visited St. Paul's Cray on the invitation of Mr. W. Smithers, the Member for Chislehurst, and Mr. T. H. Nash, the Chairman of the local Parish Council, and inspected a bungalow which has been erected as a demonstration of the possibility of erecting a dwelling at a greatly reduced price.

Some months ago a conference was held at Sidcup to consider the housing question, especially in regard to alternative methods of construction. Mr. Nash, who has for a long time interested himself in the subject, ventured the opinion that it was possible to erect a bungalow dwelling of five rooms at a cost of £250. When doubts were expressed, he undertook to erect such a dwelling. To-day the result was examined. The first demonstration bungalow is now about to be occupied, and two further bungalows are being erected and shew how the first ideas have been improved upon The visitors were much impressed by the simplicity of the method adopted, and the ingenious way in which theories have been applied.

The building material is concrete, and in its employment a very important difficulty has been solved. The principal obstacle to the use of concrete in the past has been that of condensation. One method of overcoming this was to have a thin outer shell of non-porous blocks and an inner one of porous blocks, joined across a two-inch cavity by iron ties. That, however, takes away the economic advantages of concrete and produces two partitions, one of which is liable to shrink more than the other. Mr. Nash succeeded in producing a concrete block which combines density on the outside to withstand the weather, a porous centre, and an inner side possessing a surface that will take either distemper or paper.

The raw material was clinker, ashes and house refuse, which had been deposited long enough to allow the vegetable matter to become decomposed. This was put through a quarter-inch screen. The matter which would not pass through was washed and used for the inner side of the block. The outside of the block was made of broken clinker and ashes that would pass through the screen. The fine material, mixed in the proportion of six to one of cement, was placed at the bottom of the mould; the centre portion was filled with coarser material, and while still in a wet condition was given a thin dressing of three parts of fine ashes to one of Keen's cement. Within a few hours it was possible to slacken the bolts. The porous character of the centre has been demonstrated to do away with the condensation.

Once the material was prepared the task of standardizing production was embarked upon, and this has been satisfactorily solved. The blocks used are 4ft. and 3ft. long, 1ft. high by 6in. thick. They were cast four at a time on a thin frame. The bungalow measures 24ft. by 28ft. and everything, including fittings, has now been standardized and is capable of being erected by unskilled labour. It was stated that two men could make the blocks and erect the walls of two cottages in something like six weeks. The bungalows are pleasing in appearance, and are arranged with a view to the convenience of the housewife. The rooms open off a hall passage, at the end of which is a bathroom. The living room is light and airy, and though the bedrooms are small they, at any rate, provide that separate accommodation for a family which is too often lacking in the dwelling commonly available for rural workers.

Mr. Nash and Mr. Smithers have interested themselves in this problem with a view to shewing that the problem of rural housing can be solved, and it has been arranged that sets of plans can be obtained at a small fee by anyone interested and desirous of copying this model. The Members of Parliament who inspected the processes and the erection of the buildings to-day commented in favourable terms on the ingenunity which had been brought to the solution of a difficult problem. They were interested to learn that the bungalows had been inspected by an official of the Ministry of Health and had qualified for the subsidy. By means of the system it is possible that a revolution in rural housing might be brought about, and it was also suggested that dwellings of the type might be of great utility in the case of new coalfields which are being opened up.

Mr. Nash was congratulated on having made good his claim that rural bungalows could be erected at a cost of £250, and he explained that the experiment had been made with the idea of producing a cottage for working-class families at an economic rent. The Members of Parliament who visited St. Paul's Cray were Major G. F. Davies (Yeovil), Captain D. W. Gunston (Thornbury), Major E. Ruggles-Brise (Malden), Lieutenant-Colonel G. Windsor-Clive (Ludlow), and Mr. R. J. Neville (East Norfolk).

Shewing the porosity of the centre of concrete blocks. Water passing as through a sieve.